

Minor comments:

1) Norpinonic acid is a semi-volatile product which resides in both gas and particle phase. These fragmentation patterns refer to gas phase. How much important is its gas phase with respect to the particle phase? Do you have an estimation of how much volatile it is? (any measurements or estimations from the literature). This research becomes more valuable if you show that the gas phase is important (i.e., norpinonic acid resides in the SVOC regime). This discussion should be added in the Introduction.

(Shao et al., 2022) Norpinonic acid is considered a semi-volatile organic compound (SVOC) with a vapor pressure of about 1.28×10^{-4} Torr, making it a slightly more significant contributor to the gas-phase air chemical composition than pinic, pinonic, or norpinic acids. Considering this, the potential gas-particle phase transition of Norpinonic acid suggests that its kinetic transformations in gas phase may play an important role in atmosphere evolution.

2) Are there any previous literature describing the fragmentation pattern of other important α -pinene SOA products? (e.g., pinic acid, pinonic acid, norpinic acid, etc.). If yes, how much similar, or different is their fragmentation? How, much easy or difficult would be to distinguish norpinonic acid from other α -pinene SOA products in an ambient sample?

To our best knowledge there is no literature examples in which the energy-resolved fragmentation patterns have been recorded for other atmospheric relevant compounds. There is no information about the energetics of fragmentation or bond breaking process for other acids. The MS/MS mass spectra can be only compared while registered in the same conditions (collision gas pressure and kinetic energy). We are aware, that mass spectrometry has been widely used in analytical atmospheric chemistry and fragmentation spectra has been recorded for various of other air-present acids. This suggestion is very valuable, but we do not plan to expand current paper by this data because it requires a detailed analysis and will make it unacceptable long. In parallel, we are currently working on a very similar project where series of acids and their fragmentation patterns, together with detailed energetics will be compared by using highly advanced statistical methods.

Technical corrections:

Page 1, Line 10: Please replace "O3" with "O₃".

Corrected.

Page 1, Line 31: "from a biomass burning" delete "a".

Corrected.

Page 2, Line 34: Please replace "result with" with "result in".

Corrected.

Page 2, Line 37: Please replace "among which, compounds with carboxylic functional groups are observed in large amount." with "among which, a large number of compounds containing carboxylic functional groups".

Corrected.

Page 2, Line 42: Pathak et al., 2007 is a chamber study, without chemical analysis, so, it doesn't fit here.

Deleted.

Page 2, Line 44: Please add more recent studies.

Reference were added.

Page 2, Line 54: Please replace “during the field or ambient samples analytical process” with “during ambient samples analytical process”.

Corrected.

Page 3, Line 69: “to initiate of each” please delete of.

Corrected.

Page 3, Lines 74-76: Expanding.... atmosphere” Please rephrase the sentence.

Rephrase.

Page 3, Line 80: Please replace “method by Moglioni et al. (Moglioni et al., 2000)” with method by Moglioni et al. (2000)”.

This way of writing is due to the journal's guidelines on how to cite.

Page 3, Line 96: Please replace “In presented studies” with “in the present study”.

Corrected.

Page 4, Line 119 and Page 5, Figure Caption 1: Please replace “ 3.54×10^{-4} ” with “ 3.54×10^{-4} ” (in several places in the manuscript “ 10^{-4} ” should be replaced by “ 10^{-4} ”.

If I understand correctly, the idea was to use a high index. Corrected.

Page 7, Line 148: Please replace “the m/z 69 anion” with “m/z 69 anion”.

Corrected.

Page 7, Line 149: Please replace “Second pathway,” with “The second pathway,”.

Corrected.

Page 7, Line 161: Please replace “comparison the other” with “comparison with the other”.

Corrected.

Page 8, Line 171: “Rearrange” with “be rearranged”.

Corrected.

Page 8, Line 174: Please replace “by Yasmeeen, F. et al,” with “by Yasmeeen et al. (2010)”.

This way of writing is due to the journal's guidelines on how to cite.

Page 8, Line 176: “understanding of the” please delete “of”.

Corrected.

Page 8, Lines 176-178: While....is formed” The syntax of this sentence doesn't seem correct, please rephrase it.

Corrected.

Page 8, Line 179: Please replace “fact the excellent” with “fact an excellent”.

Corrected.